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Growth and Fruiting of Three Grapefruit Cultivars (*Citrus paradisi*) Grown Under Upper Egypt Conditions

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Abstract

Tree vegetative growth, leaf mineral contents, yield components and fruit quality of three grapefruit cultivars namely, March, Red Blush and Ruby Red were studied under upper Egypt conditions during three successive seasons, 2009, 2010 and 2011. The results of this investigation could be summarized as follow:

There was a great variability in vegetative growth traits, yield components and fruit quality of these cultivars. March grapefruit trees cultivar surpassed in vegetative growth and vigour compared to either Red Blush or Ruby Red trees cultivars. Also, March grapefruit cultivar was superior among the other cultivars in inducing the highest fruit set, largest fruit number and consequently the heaviest yield/tree. On the other hand, Red Blush grapefruit trees were superior in fruit quality and followed by the Marsh tree cultivar in its vegetative growth and productivity. On the account of the present findings, it can be concluded that March or Red Blush trees cultivars under this conditions gained the highest yield with good fruit quality.

Key words: Citrus, grapefruit, growth, yield components, fruit quality, leaf mineral content.

Introduction

Citrus is the backbone of fruit crop cultivation in Egypt. The main grown species are sweet oranges, mandarins, limes and grapefruit. Marsh, Red Blush and Ruby are new cultivars of grapefruit recently grown in Egypt. These cultivars are consumed as fresh fruit and also as processed products.

During the last few years, citrus plantation have increased due to increased demands of local consumption and export which is expected to boom in the future. Such extensions in acreage are preferred to be accompanied by more studies regarding the growth and productivity of the involved varieties under different climatic conditions to recommend the best variety that could be commercially successful in a specific area.

There more, citrus production must use the most efficient techniques and practices for rapid recovery of capital investment and maximum net returns. A long-term field study was conducted to evaluate the performance of some citrus trees (Mongi

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Zekri, 1999 and Bassal, 2009).

The normalized difference vegetation index (NDVI) provides relative estimates of vegetation vigour, density and health. Little information is available on the application of NDVI imagery for citriculture. Images of two south Texas citrus graves with stressed and non-stressed trees were qualitatively evaluated. Stressed trees were easily detected from non-stressed trees in the images. The images were also helpful for developing survey plants of the citrus groves. Airbone DNVI images could be used as a tool to assess tree conditions in citrus orchards. Findings should be of interest to citrus growers, extension agents, agricultural consultants and private surveying companies (Fletcher *et al.*, 2004).

Three species (35 varieties) of commonly utilized citrus fruits (*Citrus sinensis, Citrus reticulate* and *Citrus paradise*) were collected and analyzed for their physicochemical of juice. Vitamin C, potassium, total soluble solids and specific gravity of *Citrus sinensis* were higher than that of the other two species. On the other hand, *Citrus paradisi* have higher titratable acidity, pH and sodium (Na) contents than other two species. Juice percentage higher in *Citrus reticulata* than other species. These fruits are potential sources of vitamin C and minerals (Khan *et al.*, 2010). There is only limited information concerning the grapefruit trees growth and vigour as well as yield and fruit quality under Upper Egypt conditions. The studied grapefruit cultivars in this investigation were chosen according to the earlier or promising performance in other areas.

The objectives of this study were to investigate the vegetative growth, fruit set, yield, fruit quality and leaf mineral contents for three grapefruit cultivars namely, Marsh, Red Blush and Ruby Red budded on volkamer lemon rootstock under prevailing climatic conditions in El-Kawther region, Upper Egypt.

The importance of this study lies in the fact that these cultivars had never been previously investigated under the climatic condition of upper Egypt. Obtainable results will be of prime importance which may help to guide citrus growers under environmental conditions of Upper Egypt.

Materials and Methods

This study was carried out during 2009, 2010 and 2011 successive seasons on twelve trees of 6 years old Marsh, Red Blush and Ruby grapefruit cultivars budded on volkamer lemon (*Citrus volkameriana*) rootstock in the Experimental Farm of Sohag, Fac. of Agriculture situated at El-Kawther region, Sohag Governorate, Egypt. The selected trees were vigour and productive, planted at 5x5 meter apart, irrigated by Nile water using drip irrigation system. The texture of the tested soil is sandy calcareous soil (Osama, 2003). All the chosen grapefruit cvs. trees had re-

ceived regular and horticultural practices that already were carried out in the citrus orchards. These common practices included hoeing, pest control management, irrigation and fertilization with 20 m^3 organic manure, 800 kg ammonium sulphate (20.6% N), 200 kg super phosphate (15.5% P_2O_5) and 200 kg potassium sulphate (48% K_2O). Organic manure was added once (at the second week of December). In all the three seasons, ammonium sulphate fertilizer was splitted into four equal batches before blooming (on the second week of February), just after fruit setting (on the last week of March), at two month later and at another two month later. Phosphate fertilizer was added twice at equal batches, the first with organic manure and the second just after fruit setting. Potassium fertilizer was applied at two equal batches, before blooming and just after fruit setting.

Four trees, nearly similar in growth vigour were chosen for each cultivar and arranged in a complete randomized block design. Each replicate is represented by one tree.

The three grapefruit cultivars were evaluated according to the following parameters.

Vegetative growth:

Mean shoot length (cm) of 20 completely developed shoots during spring growth cycle were measured, also the number of leaves on each shoot was recorded in the last week of May. Leaf area for spring growth cycle (taken from the 4^{th} to 5^{th} leaf from the shoot base) was measured according to the following equation outlined by Ahmed and Morsy (1999).

Leaf area (cm^2) = 0.41 (length x width of leaf) + 2.01

Final fruit set percentage: Four branches were chosen and labeled on each tree, one toward each direction in all the three seasons, as such, the number of emerged flowers was recorded at full bloom (when about 75% of fully opened flowers at least) per each branch of the experimental trees. Final fruit set percentage was calculated as follows:

$$\text{Final fruit set \%} = \frac{\text{Persistent number of fruit till the harvest time}}{\text{Total number of flowers at full bloom}} \times 100$$

Yield and fruit quality:

At harvest time (November), yield as fruit number and fruit weight/tree (kg) were estimated. Ten fruits of grapefruit were taken randomly from the yield for each replicate to determine, average fruit weight (g), fruit height (cm), fruit diameter (cm), fruit shape index, juice percentage to fruit weight and fruit peel thickness (mm) was calculated and recorded. The juice was extracted from all fruits in each sample for determination of juice constituents. Total acidity using titration by NaOH at 0.1 N and phenolphthalene as an indicator then expressed as citric acid according to A.O.A.C. (1975), total soluble solids (TSS) percentage was estimated by using the hand refractometer, TSS/acid ratio was obtained from the values of total soluble solids divided by the values of total acids, and L-ascorbic acid content was determined using 2,6-dichlorophenol indophenol as outlined in A.O.A.C. (1975).

Leaf mineral composition:

In order to determine percentages of N, P and K in the leaves, twenty mature leaves (6 month old) from non-fruiting shoots and from the middle leaves of mature shoots were taken in four directions for spring growth cycle according to Chapman and Parker (1961) and Wilde *et al.* (1985). They were dried at 70°C and digested using concentrated sulphoric acid and fresh hydrogen peroxide and kept for carrying out the following chemical analysis (Pregel, 1945).

1- Percentage of N by the semi-micro kjeldahl/technique (Peach and Tracey, 1968).

2- Percentages of P and K by colorimetry and flame photometry methods, respectively (Brown and Lilleland, 1945).

General evaluation of the tested cultivars:

Scoring evaluation of the studied and tested cultivars was calculated through their vegetative growth (shoot length, leaf no. shoot and leaf area), yield components (fruit set%, fruit no/tree & yield/tree) and fruit quality (fruit weight, TSS, juice % and V.C. contents). Hundred units were shared between the previous ten characteristics (10 units for each). Within each of these parameters, the cultivar that recorded the uppermost values received all the units specified for it's relative values due to the other tested cultivars were calculated. The following equation was used to determine these characters.

$$\text{Characters} = \sum \frac{B}{A} \times 10$$

A = the highest value recorded for studied character among all cultivars.

B = value recorded for the specific character for considered cultivars.

The obtained data were statistically analyzed using the computer MSTAT-C statistical analysis package (Freed *et al.*, 1989), then LSD test at 0.05 level was used to recognize the signifi-

cance between the treatment means according to the procedure of Snedecor and Cochran (1972).

Results and Discussion

The evaluation of three grapefruit cultivars was concerned and included the tree vegetative growth and leaf nutrient status as well as yield and fruit quality.

1- Vegetative growth and leaf nutrient status:

Data present in Tables (1 and 2) described the vegetative growth characteristics and percentage of N, P and K in leaves of the three investigated grapefruit cultivars during 2009, 2010 and 2011 seasons. It is obvious from the data that the results took similar trend during the three studied seasons. Data showed great variability in vegetative traits i.e. shoot length, leaves number/shoot, leaf area and leaf dry weight % as well as leaf N, P & K contents. The Marsh trees cultivar recorded the highest values of shoot length, leaf dry weight and leaf area as well as leaves nitrogen percentage rather than the other two cultivars, Red Blush and Ruby Red trees. Contrarly, Red Blush trees was the shortest the other two cultivars, whereas, Ruby Red trees produced the least leaves number/shoot, leaf area, leaf dry weight percentage and leaf nitrogen content compared to the other two cultivars.

The recorded shoot length values were (9.68, 8.82 and 9.61 cm as an av. of the three studied seasons) for March, Red Blush and Ruby Red trees, respectively. The corresponding leaves number per shoot, leaf area and leaf dry weight were (7.45, 6.87 & 7.69 leaf), (26.22, 26.09 & 23.00 cm^2) and (46.02, 45.89 & 45.37%), respectively.

So, it can be say that March grapefruit trees were superior in both leaves number/shoot and leaf area, such character gave a pronounced increment in leaf surface expansion and promote the leaf dry weight % as well as general vegetative growth. The increment percentage of March grapefruit leaves number and leaf area were (8.44 and 13.95% as an av. of the three studied seasons), compared to both Red Blush and Ruby Red grapefruits trees, respectively.

Moreover, March grapefruit leaf had a significant increase in nitrogen content compared to Ruby Red leaf. No significant differences were recorded between March leaf-N content and Red Blush leaf N content. The obtained leaf N% were (2.17, 2.09 and 2.03% as an av. of the three studied seasons) of Marsh, Red Blush and Ruby Red leaves, respectively. On other hand, March grapefruit leaf had a significant decrement in phosphorus and potassium contents compared to other studied grapefruit cultivars. No significant differences were detected in these two nutrients among Red Blush and Ruby Red leaves. The increment percentage in leaf N% of March grapefruit leaves were (3.83 and 6.89%) over Red Blush and Ruby

Red leaves, respectively. These results were true in the three studied seasons.

The observed reduction in the leaf content of both P and K of March grapefruit leaves could be attributed to the increase in the consumption of these nutrients to face the increase in vegetative growth and vigour which resulted from increasing the uptake of nitrogen.

Thus is can be concluded that March grapefruit trees surpassed the other two studied cultivars in its vegetative growth and vigour. Such findings emphasized the fact that growth and vigour depended on cultivar, environmental conditions and agricultural practices.

Ruby and Red blush are so similar as to be indistinguishable and for all practical purposes, they may be considered to be indentical.

In addition, the grapefruit tree is vigorous and under favorable condition is one of the largest citrus trees. It's very high heat requirement for the production of good fruit quality, however, restricts its commercial culture to hot climates. Under desert conditions the color is brighter and deeper and the flavor more sprightly and pronounced than in humid climates (Ziegler and Wolfe, 1961).

2- Yield and its components:

Data illustrated in Table (3) show the fruit set percentage, number of fruits per tree and yield/tree (kg) of the three grapefruit cultivars throughout 2009, 2010 and 2011 seasons. It is obvious from data that no major differences were detected between the results which were obtained during the three studied seasons. The fruit set percentage in these cultivars ranged from 4.24 to 4.80% as an av. of the three studied seasons. The highest percentage was recorded for March grapefruit trees and the lowest one for Red Blush grapefruit trees. Moreover, the highest number of fruits per tree was registered on March trees, while the least one was recorded on the Ruby Red trees. The obtained number of fruits per tree was (266.49, 222.37 and 161.16 fruit/tree, as an av. of the three studied seasons) for March, Red Blush and Ruby Red trees, respectively. Also, it could be seen that the yield/tree was equivalent to number of fruits per tree. So, the corresponding yield/tree was (104.70, 86.08 and 61.26 kg/tree as an av. of the three studied seasons), respectively. The increment percentage of number of fruits per tree attained to (65.36 and 37.98% as an av. of the three studied seasons) for March and Red Blush grapefruit trees compared to Ruby Red grapefruit trees, respectively. Also, the corresponding increment percentage of yield/tree attained (70.91 and 40.51% as an av. of the three studied seasons), respectively.

In general, March grapefruit cultivar was superior among the other two cultivars in inducing the highest fruit set, largest fruit number and consequently the

heaviest yield/tree. Such increment in the yield/tree of March and Red Blush grapefruit trees mainly due to the increase in the number of fruits/tree as a result of improving the flowering and fruit setting. This is a good evidence for the importance of leaf surface expansion in enhancing growth and fruiting due to its important role in accelerating carbohydrate and protein synthesis and movement which aids in encouraging cell division and development of meristematic tissues.

3- Fruit quality

A- Physical properties:

It is evident from data in Table (4) that the heaviest significantly fruit weight was obtained from Ruby Red grapefruit cultivar, whereas, the lightest significantly one was recorded for March grapefruit cultivar. However, the Red Blush grapefruit cultivar gave an intermediate fruit weight. The obtained fruit weight was (370.75, 384.89 and 419.15g for the three studied seasons) for March, Red Blush and Ruby Red grapefruit cultivars, respectively.

Table (1): Shoot length (cm), leaves number/shoot, leaf area (cm^2) and leaf dry weight (%) of spring growth cycles for the three grapefruit trees cultivars during 2009, 2010 and 2011 seasons.

Characters	Shoot length (cm)				No. of leaves/shoot				Leaf area (cm^2)				Leaf dry weight (%)			
Season→ ↓Cultivar	2009	2010	2011	Mean	2009	2010	2011	Mean	2009	2010	2011	Mean	2009	2010	2011	Mean
March	9.75	9.74	9.55	9.68	7.44	7.53	7.39	7.45	26.44	27.56	26.66	26.22	44.54	48.57	44.95	46.02
Red Blush	8.88	9.38	8.21	8.82	6.86	6.91	6.85	6.87	26.16	26.60	25.51	26.09	45.10	47.24	45.34	45.89
Ruby Red	9.51	10.47	8.85	9.61	7.74	7.88	7.44	7.69	23.13	24.95	20.96	23.01	43.78	48.10	44.23	45.37
L.S.D.	**0.20**	**0.32**	**0.41**	**0.48**	**0.36**	**0.28**	**0.28**	**0.31**	**0.16**	**0.53**	**0.28**	**0.17**	**0.20**	**0.28**	**0.12**	**0.11**

Table (2): Leaf NPK contents in the three grapefruit trees cultivars during 2009, 2010 and 2011 seasons.

Characters	N%				P%				K%			
Season→ ↓Cultivar	2009	2010	2011	Mean	2009	2010	2011	Mean	2009	2010	2011	Mean
March	2.29	2.02	2.20	2.17	0.48	0.54	0.34	0.45	0.36	0.58	0.35	0.43
Red Blush	2.21	2.12	1.95	2.09	0.61	0.51	0.48	0.53	0.41	0.67	0.43	0.50
Ruby Red	2.06	1.94	2.08	2.03	0.47	0.71	0.39	0.52	0.48	0.72	0.45	0.55
L.S.D.	**0.16**	**0.11**	**0.12**	**0.10**	**0.08**	**0.12**	**0.09**	**0.06**	**0.03**	**0.08**	**0.41**	**0.05**

Table (3):Final fruit set %, number of fruit/tree and yield/tree (kg) for the three grapefruit cultivars during 2009, 2010 and 2011 seasons

Characters	Fruit set (%)				No. of fruits/tree				Yield/tree (kg)			
Season→ ↓Cultivar	2009	2010	2011	Mean	2009	2010	2011	Mean	2009	2010	2011	Mean
March	4.23	3.42	6.75	4.80	267.14	164.82	367.50	266.49	105.33	67.70	141.08	104.70
Red Blush	3.81	3.61	5.30	4.24	223.93	145.82	297.35	222.37	86.87	55.61	115.75	86.08
Ruby Red	4.12	3.06	6.41	4.53	160.88	78.48	248.13	161.16	60.90	36.43	86.46	61.26
L.S.D.	**0.41**	**0.28**	**0.77**	**0.24**	**19.49**	**11.49**	**39.02**	**11.33**	**5.97**	**4.38**	**11.98**	**3.57**

The increment percentage of Ruby Red, fruit weight was (13.05 and 8.90% as an av. of the three studied seasons) compared to March and Red Blush cultivars, respectively.

Whereas, Ruby Red grapefruits had a significantly decrement in peel thickness compared to other two cultivars. No significant differences were recorded between the fruit peel thickness of March and Red Blush cultivars. The recorded fruit peel thickness values were (5.93, 5.84 and 5.33 mm as an av. of the three studied seasons) for March, Red Blush and Ruby Red fruits, respectively. Similarly, no significant differences were detected among the juice percentage of the March and Red Blush fruits. The highest percentage was recorded for Red Blush cultivar, whereas, the lowest one of Ruby Red fruits. The recorded juice percentage was (46.87, 48.18 and 43.02% as an av. of the three seasons) for March, Red Blush and Ruby Red, respectively. Such results may be due to reducing the number of fruits per tree consequently improvement the ratio of leaves to fruits number, induce an increase in the fruit growth rate since a better supply of food material (carbohydrates) that are manufactured in the leaves (Mostafa and Abdel-Aal, 2009).

Comparing the fruit height, diameter and shape index of fruit of the three studied cultivars, it could be concluded from Table (5) that the diameter and shape index of fruit took a similar trend to that of the fruit height, where the March cultivar recorded the highest values of these traits. However, Red Blush cultivar recorded the lowest values of them. The obtained fruit height was (8.72, 8.36 & 8.55 cm as an av. of the three studied seasons) for March, Red Blush and Ruby Red cultivars, respectively. The corresponding fruit diameter values were (9.41, 9.27 and 9.32 cm as an av. of the three studied seasons), respectively. Hence, the fruit shape index was (0.93, 0.90 and 0.92 as an av. of the three studied seasons) for March, Red Blush and Ruby Red fruits cultivars, respectively.

B- Chemical properties:

It is evident from the obtained data shown in Table (6) that the Red Blush and March cultivars had a significantly im-

provement in the chemical juice constituents of fruits in terms of increasing total soluble solids, total soluble solids/acid ratio and content of juice ascorbic acid and decreasing the percentage of total acidity. Also, it could be possibly notice from such data that total soluble solids and total soluble solids/acid ratio were vise versa to total acidity percentage.

Comparing the chemical juice contents of the three studied cultivars, it was found that the Red Blush had the highest value of these traits and the lowest one of total acidity. March cultivar had an intermediate values. However, Ruby Red cultivar gave the lowest values of these estimate, except, the highest values of total acidity percentage and significant differences were detected between these cultivars.

Concerning the TSS value, it was (10.38, 10.59 & 10.26% as an av. of the three studied seasons) for March, Red Blush and Ruby Red fruit cultivars, respectively. The corresponding total acidity percentage was (1.65, 1.58 & 1.77% as an av. of the three studied seasons), respectively. Hence, TSS/acid ratio attained (6.29, 6.69 & 5.80 as an av. of the three studied seasons), respectively. Therefore, Red Blush fruit juice was the superior among the other two cultivars in ascorbic acid contents, since the values of such estimate attained (27.91, 28.25 & 24.05 mg/ml as an av. of the three studied seasons) for March, Red Blush and Ruby Red fruit cultivars, respectively.

These results might be due to that the March and Red Blush grapefruit trees surpassed the Ruby Red ones in their vegetative growth vigour and total leaf surface area. These traits gave adequate carbohydrates and other essential food for the fruits, consequently enhanced the fruit maturity and increased its chemical juice constituents.

In general, March grapefruit tree surpassed the other two grapefruit cultivars in its vegetative growth and vigour and productivity. On other hand, Red Blush grapefruit trees was superior in eating quality and followed by the March tree cultivar in its vegetative growth and vigour as well as yield/tree.

General evaluation of the three grapefruit cultivar:

It is quite evident from Table (7) that the general evaluation of the three grapefruit cultivars as an average of the three studied seasons. According to vegetative growth, yield and fruit quality emphasized that the March grapefruit cultivar gained the highest recorded scores (98.1 units) such cultivar recorded similar values according to vegetative growth and yield/tree (30 & 30 units), that the totally scoring for evaluation of these traits.

Contrarly, Ruby Red grapefruit cultivar recorded the least total score (86.3 units). It could be arranged these scores in a descending order as follows 98.1, 92.7 and 86.3 units for March,

Red Blush and Ruby Red cultivars, respectively. These findings might be due to that both of March and Red Blush trees had a good vegetative growth and vigour (30 & 28.5 units), consequently improved the final yield (30 & 25 units) and fruit quality (38.1 & 39.2 units). Such improvement was previously explained.

These results emphasized the importance of growth and vigour of trees to obtaining the high yield, in addition to improving the fruit quality. Generally, it may be concluded that because both March and Red Blush grapefruit trees gained the highest scores, they must be planted under this area conditions.

Table (4): Fruit weight, fruit peel thickness and juice percentage of the three grapefruit cultivars during 2009, 2010 and 2011 seasons.

Characters Season→	Fruit weight (g)				Fruit peel thickness (mm)				Juice (%)			
↓Cultivar	2009	2010	2011	Mean	2009	2010	2011	Mean	2009	2010	2011	Mean
March	372.86	421.87	317.52	370.75	6.19	5.51	6.08	5.93	46.13	43.93	50.55	46.87
Red Blush	386.16	375.09	393.41	384.89	6.25	5.32	5.95	5.84	48.43	45.25	50.85	48.18
Ruby Red	424.54	481.50	351.41	419.15	5.56	4.99	5.43	5.33	42.46	40.10	46.50	43.02
L.S.D.	**20.26**	**15.35**	**18.65**	**15.11**	**0.08**	**0.24**	**0.20**	**0.11**	**2.69**	**3.11**	**2.95**	**1.38**

Table (5): Fruit dimensions and fruit shape index of the three grapefruit cultivars during 2009, 2010 and 2011 seasons.

Characters Season→	Fruit height (cm)				Fruit diameter (cm)				Fruit shape index			
↓Cultivar	2009	2010	2011	Mean	2009	2010	2011	Mean	2009	2010	2011	Mean
March	8.73	8.89	8.54	8.72	9.41	9.63	9.15	9.41	0.93	0.92	0.93	0.93
Red Blush	8.35	8.34	8.39	8.36	9.30	9.26	9.26	9.27	0.90	0.90	0.91	0.90
Ruby Red	8.61	8.70	8.34	8.55	9.35	9.52	9.08	9.32	0.92	0.91	0.92	0.92
L.S.D.	**0.30**	**0.20**	**0.17**	**0.30**	**0.04**	**0.16**	**0.08**	**0.09**	**0.008**	**0.012**	**0.010**	**0.010**

Table (6): Some chemical constituents of fruit juice of the three grapefruit cultivars during 2009, 2010 and 2011 seasons.

Characters Season→	TSS %				Acidity %				TSS/acid ratio				L-ascorbic acid content (mg/ml)			
↓Cultivar	2009	2010	2011	Mean	2009	2010	2011	Mean	2009	2010	2011	Mean	2009	2010	2011	Mean
March	10.42	10.55	10.18	10.38	1.72	1.63	1.61	1.65	6.09	6.48	5.30	6.29	29.09	31.46	23.18	27.91
Red Blush	10.62	10.41	10.74	10.59	1.64	1.43	1.67	1.58	6.52	7.28	6.26	6.69	28.65	33.19	22.90	28.25
Ruby Red	11.30	10.38	10.10	10.26	1.77	1.75	1.78	1.77	5.82	5.87	5.71	6.80	24.01	25.13	23.00	24.05
L.S.D.	**0.08**	**0.24**	**0.16**	**0.14**	**0.06**	**0.04**	**0.11**	**0.06**	**0.02**	**0.12**	**0.04**	**0.07**	**0.28**	**0.35**	**0.18**	**0.24**

Table (7):General evaluation of the three grapefruit cultivars for growth, yield and fruit quality as an average of the three studied seasons.

Characters / Score units→	Vegetative growth				Yield components				Fruit quality					
	Shoot length (cm)	Leaf No/ shoot	Leaf area (cm^2)	Total	Fruit set %	Fruit No/ tree	Yield/ tree kg	Total	Fruit weight (g)	TSS %	Juice %	L-ascorbic acid content (mg/ml)	Total	Grand total
↓Cultivar	10	10	10	30	10	10	10	30	10	10	10	10	40	100
March	10.0	10.0	10	30	10	10	10	30	8.8	9.7	9.7	9.9	38.1	98.1
Red Blush	9.1	9.5	9.9	28.5	8.5	8.3	8.2	25	9.2	10	10	10	39.2	92.7
Ruby Red	9.9	9.2	8.8	27.9	9.5	6.0	5.8	21.3	10	9.7	8.9	8.5	37.1	86.3

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نمو وإثمار ثلاثة أصناف من الجريب فروت نامية تحت ظروف مصر العليا

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أجريت هذه الدراسة خلال ثلاثة مواسم متتالية 2009 ، 2010 ، 2011 علي ثلاثة أصناف من الجريب فروت (مارش – بلوش الأحمر – روبي) بمزرعة كلية الزراعة جامعة سوهاج بمنطقة الكوثر بغرض دراسة النمو الخضري والمحصول وخصائص الثمار لتقييم هذه الأصناف تحت الظروف المناخية لمصر العليا.

وقد أوضحت النتائج :

– وجود فروق جوهرية في صفات النمو الخضري ومكونات المحصول وخصائص الثمار.

– تظهر النتائج تفوق أشجار الجريب فروت مارش في مقاييس النمو الخضري وقوة نمو الأشجار مقارنة بالصنفين الآخرين.

– تميز أشجار الصنف مارش بزيادة عقد الثمار ووزنها وبالتالي المحصول الوفير.

– يتفوق الصنف بلوش الأحمر في صفات الثمار الكيميائية ويلي الصنف مارش في مقاييس النمو الخضري.

من هذه الدراسة يتضح تميز أشجار الصنفين (مارش وبلوش الأحمر) تحت ظروف مصر العليا وبتفوق الصنف مارش بالمحصول الوفير. وعليه ينصح بزراعة هذين الصنفين تحت هذه الظروف والظروف المماثلة وفي حالة المفاضلة يفضل الصنف مارش.